Some Observations on the Lagoon Plankton of Eniwetok Atoll[1]

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DURING THE COURSE OF a translagoon ecological study conducted in the northern Marshall Islands during 1955, a series of plankton hauls were taken. Subsequent analysis revealed several interesting aspects of lagoon plankton, in addition to recording the forms present.

Eniwetok Atoll lies at about 11° 30′ N. latitude and 162° 15′ W. longitude. The atoll is composed of 38 islets on a reef surrounding an oval lagoon approximately 30 kilometers wide and 40 kilometers long. The lagoon is essentially a self-contained body of water with a maximum depth of 65 meters. There are 3 major passes between the lagoon and the open ocean; southeast pass, 550 meters wide with an average depth of 31 meters, south pass, 9.5 kilometers wide with an average depth of 18 meters, and southwest pass, 4.3 kilometers wide with an average depth of 7 meters.

From 4 April 1955 to 29 December 1955, 21 plankton hauls were made along a transect extending from between Giriinien and Rigili islets to Aniyaanii Islet (Fig. 1). Each individual series contained a haul made just inside the reef on the east end of the transect, from 1 to 3 hauls equidistantly placed along the transect, and a haul taken just inside the reef on the west end of the transect. All series were completed during periods within 2½ hours of local apparent noon. Individual series were taken at speeds from 1 to 2½ knots at depths ranging from 1 to 3 meters. The plankton collected were stored in 10 per cent sea water–formalin for subsequent treatment. All hauls were taken using a one-half meter plankton net constructed for quantitative work (Tester, 1955) with an internally mounted Atlas-style flow meter.

During this period, standard oceanographic observations were made. The mean value, range, and standard deviation of certain physical and chemical characteristics of the transect surface water is indicated below.

	Temperature °C.	Salinity °/oo	Oxygen % sat.
mean	28.61	34.37	90.0
range	28.31–29.13	34.05–34.67	59.9–104.7
σ	.023	.046	7.9

No apparent correlation was noted between these factors and the intralagoon plankton distribution.

The results of the plankton hauls, as indicated for occurrence in Table 1, for dominance in Figure 2, and for volume in Figure 3, suggest a surprisingly "endemic" (as opposed to

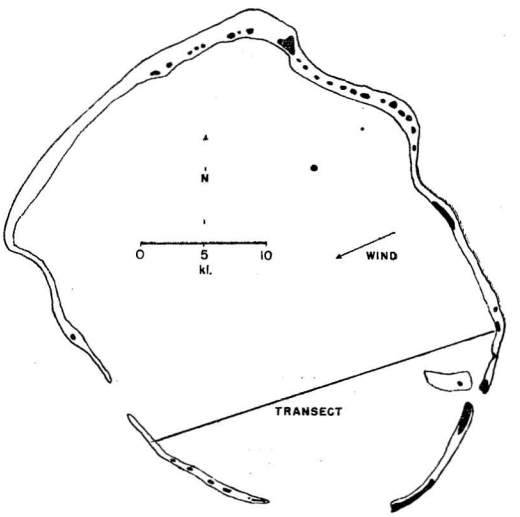

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FIG. 1. Eniwetok Atoll showing transect line.

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TABLE 1

ABUNDANCE OF PLANKTON CONSTITUENTS BY HAUL
A = abundant, 5 per cent or more by number; C = common, 1–5 per cent by number;
S = scarce, less than 1 per cent by number

	PLANKTON HAUL AND DATE																				
	April 4				Nov. 10					Nov. 13			Dec. 26				Dec. 29				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Cyanophyta:																					
Trichodesmium erythraeum				S					S		S	S									
Chrysophyta:																					
Coscinodiscus sp.						C							S				C	C	C	S	
Protozoa:																					
Foraminifera sp.						S	S	S	S	S				S	S	S		S	S		S
Radiolaria sp.								S			S			S	A		S	S			
Coelenterata:																					
Anthozoa sp. (sea anemone)																	S				
Scyphozoa sp.	S	A	S	A	S	A	A	A	S	A	A	C	S	S		A					S
Siphonophora sp.	S		S	A	S				S			C			C	C	C		C	C	C
Ctenophora:	S	A	A														S				
Brachiopoda:																					
Lingula sp. larva	S	S	S		S	S									S						
Echinodermata:																					
Ophiuroidea sp. larva								C				S									
young adult																S					
Echinoidea sp. larva									S												
Chaetognatha:																					
Sagitta sp.	S																		C		
Sagitta enflata	A	A	A	A	A	A	A	A	A	C	A	C	A	A	A	S	C	C	C	C	C
Sagitta neglecta	S				S	A														C	S
Sagitta regularis					S				S											C	S
Mollusca:																					
Heteropoda																					
sp. larva																	S				
Atlanta sp.		S				S	S	S	S		S	S			S				S		A
Pteropoda																					
sp.																					
Creseis virgula								S			C	S									
Gastropoda																					
sp. larva			S		S	S	S	S	S	S		S		S	S		S	S	S		
Natica sp. larva		S				S					S	S									
Annelida:																					
sp. larva		S			S	S		S		S								S			
Arthropoda:																					
Copepoda sp.			S				S	S	S								S				
Arcartia sp.																		S			
Candacia ethiopica											S						S	S	S	S	
Centropages calanius											S						S		S	S	S
Copilia mirabilis										S											
Corycaeus sp.											S							S		S	
Euchaeta marina				S														S			
Labidocera sp.			S		S																
Labidocera laevidentata										S											
Macrosetella gracilis															S						
Neocalanus gracilis									S												
Onceae sp.										S											
Arthropoda:																					
Pontellina plumata					S							S						S			
Pontellopsis sp.										S		S							S		

TABLE 1 (Continued)

ABUNDANCE OF PLANKTON CONSTITUENTS BY HAUL
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	PLANKTON HAUL AND DATE																			
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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Sapphrina sp.		S									S	S								S	
Scolecithrix danae											S										
Tortanus gracilis					S																
Undinula vulgaris	C		S		S					S	S		C	C	S	S	O	C	S	S	
Amphipoda sp.	S	S		S		S	S			S	S	S		S							
Isopoda sp.										S											
Mysidacea sp.																	S				
Euphausiacea sp.									S	S		S			S					S	
Stomatopoda sp. larva		S		S	S	S		S	S		S	S			S	S		S			
Decapoda																					
Macrura larva	S		S	S	S	S	S	S	S	S	S	S	C							S	S
Anomura larva									S		S		S	S							
Brachyura zoea		C	S	S	S	S	S	A	A	C	A	A	A	A	C	S	S	S	A	A	S
Chordata:																					
Oikopleura sp.	A	A	A		A	A	A		S				C	S	S	A	S	S	C	C	
Salpa sp.		S					S	S	S			S									
Thalia democratica																		S			
fish eggs	S	S	S	S	S	S	S	S	S	S		S	S	C	C	C	A	A	C	C	A
Goby eggs	S	S			S	S			S				A		C		C	C			A
fish larva	S		S	S	S	S	S	S	S	S	S	S	S	S	S				O		
Monocanthus sp. larva								S													

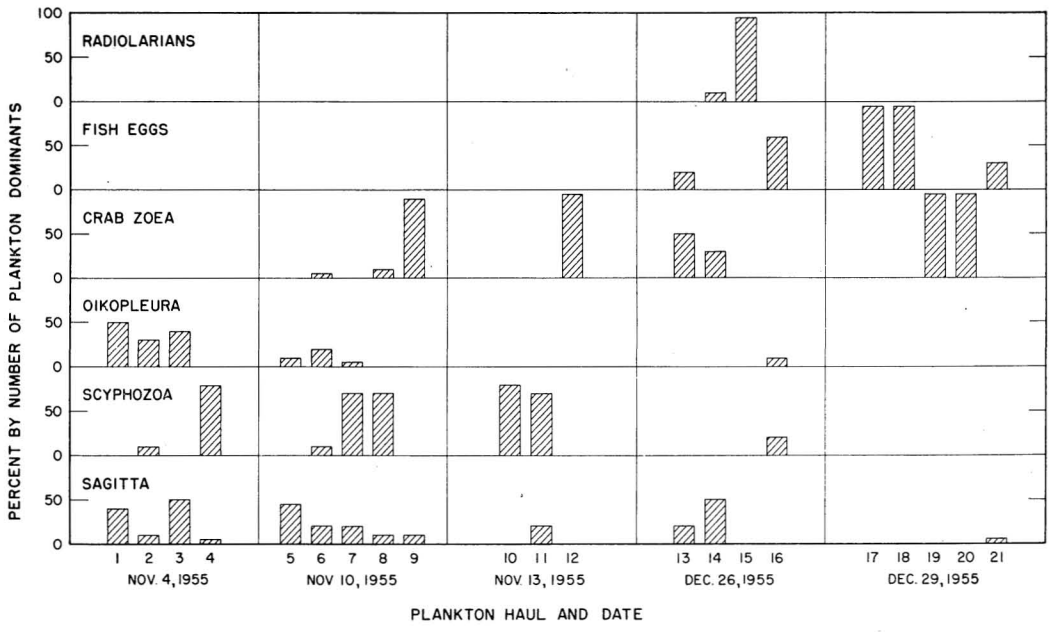

FIG. 2. Relative plankton constituents.

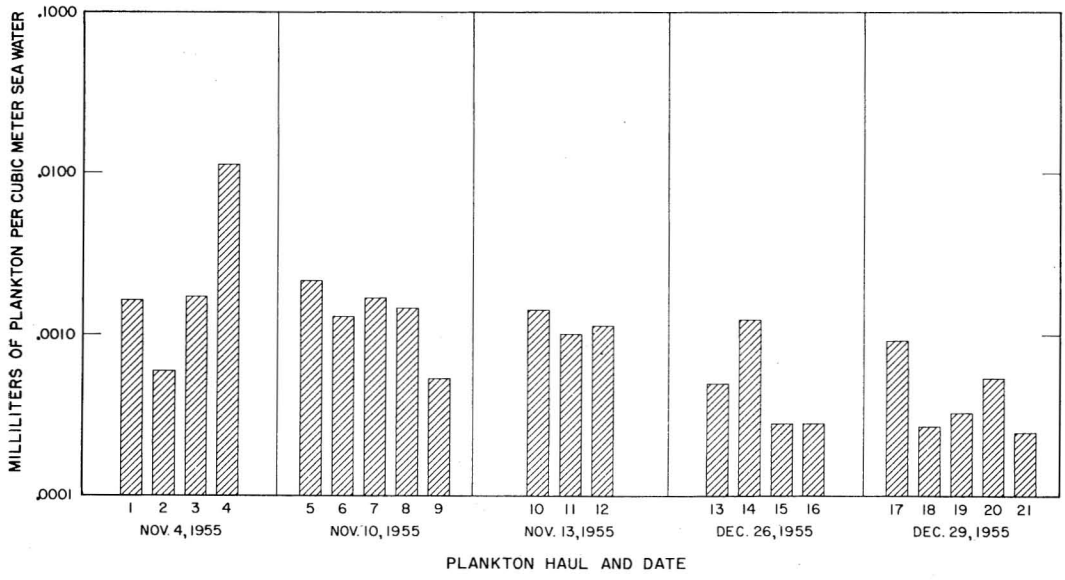

FIG. 3. Plankton settling volumes.

"transient") lagoon plankton population compared with that reported from other northern Marshall Islands atolls (Johnson, 1954). An analysis of the plankton dominants show that over half of the hauls were dominated by meroplanktonic forms, e.g., brachyura zoea, or groups the majority of which are neritic, e.g., scyphozoan medusea. In some of the hauls, these forms made up 95 per cent of the number of planktants collected. Certain of the species noted, e.g., *Undinula vulgaris*, have relatively long life cycles. For these and the noted meroplanktonic forms to maintain the relative concentrations indicated by these hauls would suggest a relatively stable body of lagoon water. The lack of numerous deep passes between the ocean and the lagoon, common in other northern Marshall Islands atolls, might explain this indicated restriction in water exchange.

REFERENCES

JOHNSON, MARTIN W. 1954. *Plankton of Northern Marshall Islands*. Geol. Survey Prof. Paper 260-F.

TESTER, ALBERT L. 1954. Variation in egg and larva production of the anchovy, *Stolephorus purpureus* Fowler, in Kaneohe Bay, Oahu, during 1950–1952. *Pacific Sci.* 9(1): 31–42.